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FORM PTO - 1449

APPLICANTS:

Zilles et al.

ATTORNEY DOCKET NO.: MIT-051CN2 (5473/53)

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INFORMATION DISCLOSURE STATEMENT

SERIAL NO.: FILING DATE: 10/055,565

October 26, 2001

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			U.S. PA	TENT DOCUME	NTS		
EXAM. INIT.	_	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
B	ΑI	3,168,203	02/01/65	Gallistel	214	+>	07/07/60
	A2	3,263,824	08/01/66	Jones et al.	214	1	12/20/63
12 NE	/A3 ·	3,449,008	06/01/69	Colechia	294	88	06/08/67
XV	A4	3,618,786	11/01/71	Fick	214	1€M	01/02/69
	A5	3,637,092	01/01/72	George et al.	214	1CM-	04/30/70
Jan San San San San San San San San San S	A6	4,062,455	12/13/77	Flatau	-214	1	11/01/76
William .	A7	4,150,803	04/01/79	Fernandez	274	135A_	10/05/77
	A8	4,302,138	11/01/81	Zarudiansky	414	5	01/22/79
W.V.	7A9	4,510,574	04/09/85	Guttet et al.	-700	260_	08/23/82
W/X	A10	4,604,016	08/01/86	Joyce	A14	7	08/03/83
	All	4,632,341	12/30/86	Repperger et al.	294	230	02/06/85
V	A12	4,654,648	03/01/87	Herrington et al.	340	710	12/17/84
	A13	4,655,673	04/01/87	Hawkes	4+4	730	05/10/83
	A14	4,661,032	04/01/87	Arai	414	5_	12/18/85
A R	A15	4,676,002	06/01/87	Slocum	33	LMP	12/20/85
	A16	4,795,296	01/01/89	Jau	414	5_	10/17/86
10	A17	4,800,721	01/31/89	Cemenska et al.	.60	393	02/13/87
V	A18	4,837,734	06/06/89	Ichikawa et al.	264	513_	02/26/87
W.V.	A19	4,839.838	06/01/89	LaBiche et al.	364	709.1	03/30/87
N. S.	A20	4,888,538	12/19/89	Dimitrov et al.	318	675	05/14/87
	A21	4,893,981	01/16/90	Yoshinada et al.	414	5	03/26/87
A IV	A22	4,907,970	03/01/90	Meenen, Jr.	434	45.	03/30/88
A N	A23	4,907,970	03/13/90	Hon	434	262	11/14/88
	123	4,707,773	03/13/70				1

Dale Considered: 7/29/04



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M.	A24	4,988,981	01/01/91	Zimmerman et al.	340	709	02/28/89
	A25	5,004,391	04/01/91	Burdea	414	6	08/21/89
	A26	5,007,300	04/01/91	Siva	74	471 X	01/22/90
	/A27	5,018,922	05/01/91	Yoshinada et al.	414	5	09/12/89
	A28	5,019,761	05/28/91	Kraft	3.18	_568.Ļ	02/21/89
A STATE OF THE STA	A29	5,038,089	08/01/91	Szakaly	.318	568.L	10/28/88
N	A30	5,044,956	09/01/91	Behensky et al.	-434	-45	01/12/89
N. D.	A31	5,072,361	12/10/91	Davis et al.	364	167:1-	02/01/90
N	A32	5,103,404	04/07/92	McIntosh	318	568.2	12/20/89
	A33	5,116,051	05/01/92	Moncrief et al.	273	-448 B	06/08/90
A	A34	5,116,180	05/01/92	Fung et al.	414	5	05/03/90
MR	A35	5,142,931	09/01/92	Menahem	74	471-XY	02/14/91
1	A36	5,143,505	09/01/92	Burdea et al.	414	5	02/26/91
M	A37	5,184,319	02/02/93	Kramer	364.	806-	02/02/90
M	A38	5,193,963	03/01/93	McAffee	414	5	10/01/90
N/A	A39	5,223,776	06/29/93	Radke et al.	318	368.1	12/31/90
N	A40	5,239,246	08/24/93	Kim	318	<u>568.1</u> 1	07/08/92
Ne	. A41	5.255,211	10/01/93	Redmond	.164	578	02/22/90
N	A42	5,264,768	11/23/93	Gregory et al.	318	-561	10/06/92
M	A43	5,266,875	11/01/93	Slotine et al.	393	99x	05/01/91
	A44	5,354,162	10/01/94	Burden et al.	414	-5	10/11/94
No	A45	5,382,885	01/17/95	Salcudean et al.	318	-568JI	08/09/93
N	A46	5,389,865	02/14/95	Jacobus et al.	318	568.11 —	12/02/92
N	A47	5,429,140	07/04/95	Burdea et al.	128	774	06/04/93
M	A48	5,459,382	10/17/95	Jacobus et al.	-318	-568.LL	06/09/94
N	A49	5.482.051	01/09/96	Reddy et al.	128	733_	04/06/94
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Examiner: Dobe Considered! 7/29/04

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Λ.				318	628	09/01/94
ASO ASO	5,489,830	02/01/96	Fcmandez			
ASI	5,497,452	03/05/96	Shimizu et al.	395	-12 9	03/02/92
A52	5,515,078	05/01/96	Greschler et al.	345	136~	
A53	5,576,727	11/19/96	Rosenberg et al.	345	179	06/05/95
A54	D. 377,932	02/11/97	Schena et al.	D14	114	10/31/95
NIG A55	5,623.582	04/22/97	Rasenberg	395	99	07/14/94
		04/29/97	Massie et al.	364	578	10/01/93
A56	5,625,576			318	568.11	10/16/95
A57	5,629,594	05/13/97	Jacobus et al.			03/28/96
A58	5,691,898	11/25/97	Rosenberg et al.	364	190	
1 A59	5,701,140	12/23/97	Rosenberg et al.	345	156	07/12/94
A60	5,721,566	02/24/98	Rosenberg et al.	343	161_	06/09/95
A61	5,724,264	03/03/98	Rosenberg et al.	364	359 -	08/07/95
A62	5,734,373	03/31/98	Rosenberg et al.	-345	161_	12/01/95
A63	5,737,505	04/07/98	Shaw et al.	-395	119	10/15/96
A64	5,739,811	04/14/98	Rosenberg et al.	345	161	09/27/95
X		05/12/98	Myers	345	419	01/16/96
A65	5,751,289		Roston et al.	318	561	10/22/96
A66	5,754,023	05/19/98		<u> </u>	262	08/10/95
A67	5,769,640	08/01/98	Jacobus et al.	434		
A68	5,784,542	07/21/98	Ohm et al.	395	95	10/23/96
N V A69	5,790,108	08/04/98	Salcudean et al.	345	184	10/23/92
A70	5,798,752	08/25/98	Buxton et al.	345	146	02/27/95
A71	5,844,392	12/01/98	Peurach et al.	318	568.17	05/21/97
A 72	6,046,726	04/04/00	Keyson	345	156	09/29/97
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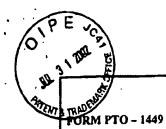
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			FOREI	GN PATEN	T-DOC	UMENT	S .		
XAM NIT.		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	FILING DATE	ABSTRA CT ONLY	ENGLISH LANG (Y/N)
12	BI	WO 96/16397	05/30/96	PCT	G09G	5/08	11/22/95	. N	Υ
es	B2 -	WO 96/22591	07/25/96	РСТ	G09G	5/00	01/17/96	N	Y
10	B3	WO 96/42078	12/27/96	PCT	G09G	3/02	06/07/96	N	Y
	B4	WO 97/06410	02/20/97	PCT	GOIC	7/00	07/29/96	N	Y
	B5	WO 97/12337	04/03/97	PCT	G06F	19/00	09/25/96	N	Y
1/2	B6	WO 97/12357	04/03/97	PCT	G09G	5/00	09/25/96	N	Υ
10	B7	WO 97/19440	05/29/97	PCT	G09G	5/00	11/05/96	N	Y
	B8	WO 97/21160	06/12/97	PCT	G06F	N/A	11/26/96	N	Y
1912	C		OTHER AF	RT, JOURN	AL ART	ICLES, E	TC.	······································	
XAM. NIT.		OTHER DOCU	IMENTS: (II	scluding Auth	or, Title, I	Date, Refev	ant Pages, Pli	ace of Public	ation)
	CI	Adachi, Y., "Tou Reality Annual Is	ch and Trace	on the Free-Fo	nn Surface	of Virtual	Object," Proce	edings of IEI	EE-Virtual
	C2	Agrawala, M. et							9.
	C3	Atkinson, W. D.	ct al., "Compt	iting with Feel	ing" COM	PUT & GE	APHICS, Vo	l. 2, 1977, pg:	. 97-103 .
	C4	Barr, Alan H.; "C			ns of Solid	Primitives	", COMPUTE	R GRAPHIC	S; Vol. 18,-
	C5	No. 3, pgs. 21-30 Blinn, 1 F., "Sim	ulation of Wri	nkled Surface	," COMPL	JTER GRA	PHICS, Volu	ne 12-3, Aug	из і 1978, р е
- -	C6	2 86-292. -Brooks, F. P. et a	1. "Project G	ROPE - Haptic	Displays	f or Scientif	ic Visualizatio	п," СОМРИТ	ER
,	C7	GRAPHICS, Vo Colgate, J. E. et: Society Press, Le and Automation,	al., "Factors A es Alamitos, C	ffecting the Z-	Width of a occedings	Haptic Dis 1994 IEE	C International	 Conference	On Robotics
	C8	Colgate, J. E. et a Los Alamitos, Ca and Systems - Hi Pennsylvania, 19	al., "Issues in alifornia_in Pr uman Robot Ir	the Haptic Dis accedings:-19 terection and	play of Too 95-IEEE/R	ol-Use," pul SI-Internat	olished by IEE ional Conferen	E Computer S	Society Pres
	C9	Dworkin, P. ot al Workshop Proce	"A New Me	dal for Efficie	nt Dynami cal Report	c," Fount I Series, ISS	urographics 7 N 1017-4656,	infiniation and September 4-	l Simulatio n 5 , 1993, pp .



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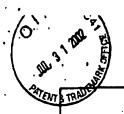
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C10	Louis Het at "Parallel Manipulator," Proceedings of 3rd Robotics Research: The Third International Symposium, Faugeras & Giralt, eds., MIT Press 1986.
CII	International Symposium, (September 18-22, 1993, Seattle, WA), pp. 287-292.
C12	Hirata, Y. et al., "3 Dimensional Interface Device for Virtual Work Space," Proceedings of the 1992 ISES, July 7-10, 1992, pp. 889-896.
CI3	Howe, R.D. et al., "Task Performance with a Dextrous Teleoperated Hand System," Telemanipulator Technology, November 1992, Proceedings of SPIE, Vol. 1833, pp. 1-9.
CI4	Immersion Corporation Website, Immersion Corporation, 1997, 4 pgs. (not admitted as prior art)
C15	Immersion Gorporation, "Laparoscopic IMPULSE ENGINED: A New PORCE FEEDBACK Surgical Simulation Tool", Immersion Corporation, 1995.
C16	Immersion Corporation, "Virtual Laparoscopic Interface", Immersion Corporation, 1995, 1 pg.
C17	Immersion Corporation, "The IMPULSE ENGINETA", Immersion Corporation, 1996.
C18	Keteku, T., et al., "A Force Display Algorithm for Virtual Environments," SICE, pp. 347-355, 1992.
C19	Kraft Telerobotics, Inc., "GRIPS Force Foodback Manipulator System," Kraft Telerobotics, Inc. (dateUnknown) 4 pps-
C20	Kraft Telerobotics, Inc., "GRIPS Master/Slave Manipulator System," Kraft Telerobotics, Inc., 1988.
C21	Kraft Ocean Systems, "Grips Underwater Manipulator System", 4 pgs. (date unknown)
C22	Marcus, B.A., et al., "EXOS Research on Moster Controllers for Robotic Devices." FIETH ANNUAL. WORKSHOP ON SPACE OPERATIONS APPLICATIONS AND RESEARCH (SOAR '91) pp. 238-245. July 1991.
C23	Massie, T. H., "Design of a Three Degree of Freedom Force-Reflecting Haptic Interface", Massachusetts Institute of Technology, Bachelor of Science in Electrical Science and Engineering Thesis, May, 1993, pgs 1-38.
C24	Massie, T. H., "Initial Haptic Explorations with the Phantom: Virtual Touch Through Point Interaction", Massachusetts Institute of Technology Master of Science Thesis, Pebruary, 1996, pgs. 1-49. (not admitted prior art)
C25	MeAffee et el., "Teleoperator Subsystem/Telerobet Demonstrator," Force Reflecting Hand Controller Fouriement Manual, Jet Propulsion Laboratory, January 1988.
C26	Minsky et al., "Feeting and Scoing: Issues in Force Display," COMPUTER GRAPHICS, Vol. 24, No. 2, March 1990, pgs. 235-270.
C27	Minsky, M., "Computational Haptics: The Sandpaper System for Synthesizing Texture for a Force-Feedba Display," Massachusette Institute of Technology Ph.D. Thesis, June, 1995, pgs. 1-217.
C28	Morgenbesser, H. B., "Force Shading for Shape Perception in Haptic Virtual Environments", Massachusel Institute of Technology Master of Engineering Thesis, September, 1995, pgs. 1-22.
C29	Saleudcan S. E. et al., "On the Emulation of Stiff Walls and Static Friction with a Magnetically Levitated Input/Output Device," DYNAMIC SYSTEMS AND CONTROL: VOLUME 1, DSC-Vol. 55-1, 1994, pgs 303-309:



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	C30	Salisbury, K., et al., "Haptic Rendering: Programming Touch Interaction with Virtual Objects," Presented and disseminated at the 1995 Symposium on Interactive 3D Graphics held April 9-12, 1995 in Monterey, GA; sponsored by the Association for Computing Machinery (ACM) and published by the ACM in Proceedings: 1995 Symposium on Interactive 3D Graphics, Monterey, California, April 9-12, 1995, pgs.
	C31	423-130. Sens Able Devices, Inc., "Phantom Haptic Interface," 1995, Cambridge, MA (2 pgs).
	C32	Sens Able Technologies, Inc., "Phantom Hapite Interface," 1996, Cambridge, MA (6 pgs).
	C33	Shimoga, K. B., "A Survey of Perceptual Feedback Issues in Dextrous Telemanipulation: Part I. Finger Force Feedback" published by IEEE Neural Networks Council in IEEE Virtual Reality Annual International Symposium, held September 18-22, 1993 in Seattle, Washington, 1993, pgs. 263-270
	C34	Snew, E. et al., "Compact Force-Reflecting Hand Controller," NASA Tech Brief, Vol. 15, No. 4 from Jet- Propulsion Laboratory Report NPO 17851-7348, April 1991, pgs. i., 1-3, 1s-11a, 14a, 15a
	C35	Sutter, P.H.; J. C. lauridis and N. V. Thakon, "Response to Reflected-Force Feelback to Fingers in Toleoperations," Proc. of the NASA Conf. on Space Telerobotics, pp. 65-74, NASA JPL, January 1989.
	C36	Swarup, N., "Heptic Interaction with Deformable Objects Using Real-Time Dynamic Simulation", Massachusetts Institute of Technology, September 1995, pgs. 1-83
	C37	Tanie, K., et al., "Force Display Algorithms", 1993 IEEE International Conference on Robotics and Automation, May 2-7, 1993, Atlanta Georgia, USA, 1993, pp. 60-78.
	C38	Wang, S.W. and Kaufman, A.E., "Volume Sculpting", 1995 Symposium on Interactive 3D Graphics, Monterey, California, pgs. 151-156
	C39	Terzopoulos, D. et al.: "Elastically Deformable Models"; COMPUTER GRAPHICS, Vol. 21, No. 4, pgs. > 205-214 (July, 1987).
	C40	Yoshikawa, T. et al., "Construction of Virtual World Using Dynamics Modules and Interaction Modules," Broccodings of the 1996 IEEE International Conference on Robotics and Automation (Minneapolis, MN), pp. 2358-2364 (April 1996).
	C41	Zilles, C. B. et el., "A Constraint-Based God-object Method for Haptic Display," published by IEEE-Computer Society Press, Los Alamitos, California, in Proceedings of the 1995 IEEE/RSJ International

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	Bi	WO 96/16397	05/30/96	PCT	G09G	5/08	11/22/95	N	Y
	B2	WO 96/22591	07/25/96	PCT	G09G	5/00	01/17/96	Ν .	Y
	В3 -	WO 96/42078	12/27/96	PCT	G09G -	3/02	06/07/96	N	Y
	B4	WO 97/06410	02/20/97	PCT	G01C	7/00	07/29/96	N	Y
	B5	WO 97/12337	04/03/97	PCT	G06F	19/00	09/25/96	N	Y
	B6	WO 97/12357	04/03/97	PCT	G09G	5/00	09/25/96	N	Y
	B7	WO 97/19440	05/29/97	PCT	G09G	5/00	11/05/96	N	Y
	B8	WO 97/21160	06/12/97	PCT	G06F	N/A	11/26/96	N	Y
		<u></u>	OTHER A	RT, JOURN	AL ART	ICLES, E	ETC.		•
EXAM. INIT.		OTHER DOC					•		
	Cl	Adachi, Y., "To Reality Annual	uch and Trace	on the Free-Fo	orm Surface	of Virtual -22, 1993,	Object," Proceed Seattle WA, p	eedings of IEI gs. 162-168.	EE Virtual
NE	C2	Agrawala, M. et	al "3D Paintir	ng on Scanned	Surfaces",	Stanford U	Iniversity, 199:	5, pgs 145-15	0.
A V	C3	Atkinson, W. D	et al., "Comp	uting with Fee	ling" COM	PUT. & GI	RAPHICS, Vo	l. 2, 1977, pg:	s. 97-103.
Nh	C4	Barr, Alan H.: " No. 3, pgs. 21-3	Global and Lo	cal Deformation	ons of Solid	Primitives	"; COMPUTE	R GRAPHIC	S; Vol. 18,
N	C5	Blinn, J.F., "Sin 286-292.	nulation of Wr	inkled Surface					
We.	C6	Brooks, F. P. et GRAPHICS, Ve	ol. 24, No. 4, A	Lugust 1990. p	gs. 177-18:	5.	•		
W	C7	Colgate, J. E. et Society Press, L and Automation	al., "Factors A os Alamitos, C , held May 8-1	Affecting the Z California, in P 13, 1994 in Sar	-Width of a roceedings n Diego, Ca	Haptic Dis : 1994 IEE difornia, V	E Internationa ol. 4, 1994, pg	l Conference s. 3205-3210.	On Robotics
S	C8	Colgate, J. E. et Los Alamitos, C and Systems - F Pennsylvania, 1	California, in Pi Iuman Robot I 995, pgs. 140-	roceedings: 19 nteraction and 145.	995 IEEE/F Cooperativ	RSJ Internative Robots, I	tional Conferented August 5-	nce on Intellig 9, 1995 in Pit	ent Robots tsburgh,
D	N C9	Dworkin, P. et a Workshop Proc 135-147.	I. "A New Me	odel for Efficie	ent Dynami cal Report	c," Fourth Series, ISS	Eurographics A N 1017-4656,	Animation and September 4-	Simulation 5, 1993, pp.

Examiner: Demola Allai

Date considerd: 4/15/05



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-//	CI0	Inoue H.et al., "Parallel Manipulator." Proceedings of 3rd Robotics Research: The Third International
M	C.10	Companies Congress & Giralt eds MIT Press 1980.
100	CII	Lunto U. "Pen-based Hantic Virtual Environment," Proceedings of IEEE Virtual Reality Annual
		l 1
N	C12	Hirata, Y. et al., "3-Dimensional Interface Device for Virtual Work Space," Proceedings of the 1992 IEEE, July 7-10, 1992, pp. 889-896.
AB	C13	Howe, R.D. et al., "Task Performance with a Dextrous Teleoperated Hand System," Telemanipulator Tasks elegy, November 1992, Proceedings of SPIE, Vol. 1833, pp. 1-9.
W/V	C14	Immersion Corporation Website, Immersion Corporation, 1997, 4 pgs. (not admitted as prior art)
1/2	C15	Immersion Corporation, "Laparoscopic IMPULSE ENGINED: A New FORCE FEEDBACK Surgical
3/2/	C16	Simulation Tool", Immersion Corporation, 1995. Immersion Corporation, "Virtual Laparoscopic Interface", Immersion Corporation, 1995, 1 pg.
NY NA	C17	Immersion Corporation, "The IMPULSE ENGINETM", Immersion Corporation, 1996.
122	C18	Kotoku, T., et al., "A Force Display Algorithm for Virtual Environments," SICE, pp. 347-355, 1992.
	C19	Kraft Telerobotics, Inc., "GRIPS Force Feedback Manipulator System," Kraft Telerobotics, Inc. (date
	000	Unknown) 4 pgs. Kraft Telerobotics, Inc., "GRIPS Master/Slave Manipulator System," Kraft Telerobotics, Inc., 1988.
M	C20	
1	C21	Kraft Ocean Systems, "Grips Underwater Manipulator System", 4 pgs. (date unknown)
M	C22	Marcus. B.A., et al., "EXOS Research on Master Controllers for Robotic Devices," FIFTH ANNUAL WORKSHOP ON SPACE OPERATIONS APPLICATIONS AND RESEARCH (SOAR '91) pp. 238-245, July 1991.
NB	C23	Massie, T. H., "Design of a Three Degree of Freedom Force-Reflecting Haptic Interface", Massachusetts Institute of Technology; Bachelor of Science in Electrical Science and Engineering Thesis, May, 1993, pgs.
M	C24	Massie, T. H., "Initial Haptic Explorations with the Phantom: Virtual Touch Through Point Interaction", Massachusetts Institute of Technology Master of Science Thesis, February, 1996, pgs. 1-49. (not admitted as prior and)
NR	C25	McAffee et al., "Teleoperator Subsystem/Telerobot Demonstrator," Force Reflecting Hand Controller
M	C26	Minsky et al., "Feeling and Seeing: Issues in Force Display," COMPUTER GRAPHICS, Vol. 24, No. 2,
M	C27	Minsky, M., "Computational Haptics: The Sandpaper System for Synthesizing Texture for a Force-Feedback Display." Massachusetts Institute of Technology Ph.D. Thesis, June, 1995, pgs. 1-217.
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